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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/507,390	04/14/2005	YuanKai Zheng	AGSGP011	1807

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EXAMINER	
LE, THONG QUOC	
ART UNIT	**PAPER NUMBER**
2827	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/02/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/507,390	ZHENG ET AL.	
	Examiner	Art Unit	
	Thong Q. Le	2827	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 January 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Amendment filed on 01/10/2007 has been entered.

2. Claims 1-26 are presented for examination.

Response to Arguments

3. Applicant's arguments filed 01/10/2007 have been fully considered but they are not persuasive.

Applicant argues :

> The *Bessho et al.* reference discloses an exchange coupling type of solid magnetic memory. In contrast, the subject application describes a field driven magnetoresistive random access memory (MRAM) and a thermally assisted MRAM. For the reasons set forth below,

4. This is improper because in response to applicant's arguments, **the recitation MRAM has not been given patentable weight because the recitation occurs in the preamble**. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

More specifically, reference Bessho et al. (U.S. 6,178,112) disclosed memory is a magnetoresistive memory (Column 39, line 60-67, **magneto-resistive**).

Applicant argues:

Column 48, lines 24-27. In contrast, in the claimed subject matter, the direction of magnetization of the storage medium is controlled by the external field in combination with a heating process.

once type (see column 20, lines 32-36). In contrast, in the claimed subject matter, the magnetization is controlled by both the external field and the temperature, with the result that the element is a recordable type instead of a write-once type.

design, the exchange coupled memory is *not* a nonvolatile memory. In contrast, in the claimed subject matter, the element is a nonvolatile memory.

carrier. In contrast, in the claimed subject matter, the storage layer is pinned by an anti-ferromagnetic layer such that the magnetization of the storage layer cannot be changed without a heating process.

switched. In contrast, in the claimed subject matter, the magnetization of the recording layer is changed by a combination of the external field and the heating process. Neither a

minimum anisotropic energy points. The claimed subject matter uses the anti-ferromagnetic layer to pin the recording layer. After cool down to room temperature, the magnetization can be maintained at any direction instead of just the minimum anisotropic energy point.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., limitations above shown in REMAK) **are not recited in the rejected claim(s).** Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

5. Applicant's arguments do not comply with 37 CFR 1.111(c) because they do not clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. Further, they do not show how the amendments avoid such references or objections.

The arguments do not show any limitation in claim, which is content have been contained in present claim as a claimed invention. It is improper as explaining above, and the rejection of previous office action still stands.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Bessho et al. (U.S. Patent No. 6,178,112).

Regarding claims 1, 16, Bessho et al. disclose a multistate magnetoresistive random access memory (MRAM) unit (Figure 2) comprising:

a substrate (Figure 8, 31),

a plurality of memory cells (Figure 2. A, B, C) formed on said substrate (Figure 8),

a bit line (Figure 2, B) and a word line (Figure 2, W) in electrical contact with said plurality of memory cells (Figure 2);

each of said plurality of memory cells (Figure 8) including a first magnetic layer (Figure8, M4), a second magnetic layer (Figure 8, M3) and a non-magnetic space layer (Figure 8, 33),

wherein a heat element (Figure 21, 112, Column 32, lines 12-20, lines 55-60) adjacent an individual cell in said plurality of memory cells heats said first magnetic layer of said cell to near its Curie point independently of other cells 9column 28, lines 20-45) , and

the magnetization vector of said first magnetic layer is aligned with a magnetic field generated by a current applied to the bit line and word line (Column 20-25).

Regarding claim 2, Bessho et al. disclose wherein said first magnetic layer has a first Curie point and said second magnetic layer has a second Curie point that is higher than the first Curie point (Figure 19, 100, 101, Column 16-38).

Regarding claims 3-7, Bessho et al. disclose wherein the first magnetic layer is a recording layer (Column 1, lines 7-12, Figure 14, 40, Column 24, lines 8-9), and the second magnetic layer is a read layer (Figure 14, 45, Column 26, lines 64-65), and wherein the direction of the magnetization vector in said second magnetic layer is changed to an anti-parallel alignment with its initial magnetizatibn vector by the magnetic field generated by the current in the word line during a read operation (Figure 16, M8, M10), and wherein, the magnetization vector in said first magnetic layer can be aligned at a plurality of angles relative to the magnetization vector of said second magnetic layer (Figure 26).

Regarding claims 10-11, Bessho et al. disclose wherein the magnetoreristance of said plurality of memory cells is dependent upon the angles between the magnetization vectors of said first and second magnetic layers (Figure 26, Column 14, lines 23-28), and wherein the plurality of memory cells are coupled into an array with each cell being individually addressable (Figure 2).

Regarding claims 12-13, 17, 19,Bessho et al. disclose wherein, said plurality or memory cells is a plurality of stacked cells including a magnetic tunnel junction cell (MTJ), or a spin-valve cell (SV) or a pseudo spin- valve (PSV) cell (Figure 1, Column 12, lines 60-61, Column 39, lines 60-63), and wherein the non-magnet space layer is a non-magnetic conductive layer in a SV cell and an insulator tunneling layer in a MTJ cell (Figure 30, 117, Column 39, lines 59-67).

Regarding claim 14, Bessho et al. disclose a method of writing data in a magnetoresistive random access memory (MRAM) unit comprising a plurality of

memory cells, a bit line and a word line in electrical contact with said plurality of memory cells, a heat element adjacent an individual cell in said plurality of memory cells, the method (Column 3, lines 63-67) including the steps of:

raising the temperature of a first magnetic layer in said individual cell to near its Curie point independently of other cells, thereby reducing the coercivity of said layer (Column 4, lines 28-40);

writing a magnetization state in said first magnetic layer of said individual cell by passing a current through said bit line and said word line, the current in said bit line and said word line acting cooperatively to align the magnetization vector in said first magnetic layer with a magnetic field generated by said current (Column 4, lines 41-62).

Regarding claim 15, Bessho et al. disclose wherein the step of raising the temperature of said first magnetic layer is provided by applying an initial current through said individual cell (Figure 1, Column 37, lines 38-44).

Regarding claim 18, Bessho et al. disclose wherein for MTJ memory cells, the heat element is a non-linear element (column 51, lines 30-32).

Regarding claim 21, Bessho et al. disclose a method of performing a read operation in a magnetoresistive random access memory (MRAM) unit comprising a plurality of memory cells, a bit line and a word line in electrical contact with said plurality of memory cells, a heat element adjacent an individual cell in said plurality of memory cells, the method including the steps of:

applying a current through said bit line and said word line (Figure 2) , determining the magnetization state of said first magnetic layer, wherein the resistance states of said

first magnetic layer is dependent, on the relative angles between the magnetization vectors of said first and second magnetic layers (column 9, lines 45-51), and said resistance states representing the magnetization states of the MRAM, and reading data represented by said magnetization states stored in said memory cells (Column 9, lines 36-51), and wherein the direction of the magnetization vector in a second magnetic layer is changed to an anti-parallel alignment with its initial magnetization vector by a magnetic field generated by the current through said word line (Figures 1, 41), and wherein the first magnetic layer is a recording layer (Figure 14, 40) and the second magnetic layer is a read layer (Figure 14, 45), and wherein for a spin valve SV MRAM, the current is applied through said bit line (Figure 2), and wherein for a magnetic tunnel junction cell (MTJ), the current is applied through said bit line and word line (Figure 2).

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thong Q. Le whose telephone number is 571-272-1783. The examiner can normally be reached on 8:00am-5:00pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zarabian Amir can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Thong Q. Le
Primary Examiner
Art Unit 2827